

## **REQUIREMENTS FOR THE SUBMITTAL OF SPRINKLER AND STANDPIPE PLANS (NFPA 13, 13D, 13R, AND 14 SYSTEMS)**

Effective: July 2007

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### **A. PERMIT PROCEDURES**

1. Permits and submittals are required for all work involving any sprinkler additions or modifications, except limited area systems of 5 or fewer sprinklers or those meeting ALL of the following criteria:
  - a. Non-residential, **and**
  - b. 10 sprinklers or less being added or modified, **and**
  - c. No increase in hazard classification or building footprint.
2. ALL sprinkler work must be performed by a contractor with a valid Maryland Sprinkler Contractor License, regardless of whether or not a permit is required. If no permit is required, a completed **Contractor's Material & Test Certificate for Aboveground Piping** must be provided to the inspector at time of construction inspection. For work requiring a permit, work on the system shall not begin until the permit is obtained and the permit and approved plans are on the job site.
3. A Fire Protection Systems Permit Application form must be completed in full and included with all initial submittals. (Remember to sign the bottom of the 2<sup>nd</sup> page.) Indicate if the system is non-required by the building and/or fire codes. **Please include email address of designer** when possible.
4. A minimum of \$75.00 must be included at the time of submission.
5. For continuations of large projects or revisions to a current permit, include a *copy* of the original permit and, if possible, a copy of the original reviewed plans.
6. The sprinkler contractor will be contacted with the result of the review as follows:
  - a. Approved plans with the comments and permit attached and ready for pick up, or
  - b. At the discretion of the reviewer, the submittal may be suspended or disapproved, and verbal, written, or emailed comments will be provided to the applicant, who is then responsible for submitting the required revisions/corrections in a timely manner.

### **B. GENERAL SUBMITTAL REQUIREMENTS**

1. Number of sets of drawings: one (1) for our retention plus the number of sets the contractor desires returned. (This includes site plans.)
2. Drawings must be original prints *with no handwritten changes after printing*.
3. Drawings must be *stapled into sets and folded*.
4. Only one (1) set of calculations is required. (Each calculated area must be stapled individually.)
5. Submittal for sprinkler permit does **not** have to wait until issuance of the building permit, and a copy of the building permit is **not** required with the sprinkler submittal.

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### **B. GENERAL SUBMITTAL REQUIREMENTS (cont'd.)**

6. Manufacturer's specifications (cut sheets) are only required for backflow preventer, detector check, water meter, and special sprinklers. Submittals with residential, ESFR, extended coverage and other sprinklers with special instructions must also include the manufacturer's advanced installation guides.
7. For modifications or additions to existing systems, the plans must show enough of the existing system to enable complete review and to verify existing system layout and compatibility of all equipment.
8. For submittals involving work on a portion of any plan (such as tenant work or partial revisions), the area of work must be clearly defined. Any areas shown that are not within the scope of work must be crossed off or otherwise delineated as outside the area of work.
9. For complexes, (such as garden apartments or town houses) where typical building(s) prevail, show only the typical arrangements and provide verification that the most hydraulically remote building (highest and most remote from water source) has been calculated.

### **C. INFORMATION REQUIRED ON DRAWINGS**

#### **1. General**

- a. Project name and address(es). (Include all addresses if scope of work covers multiple addresses.)
- b. Project owner's name and address, including zip code. (tenant for tenant work, building owner for shell work)
- c. Building construction permit number. (if available)
- d. Maryland State Fire Sprinkler Contractor License number & expiration date.
- e. Each page must include the designer's name and **original signature**, certification number, and expiration date.
- f. Sprinkler contractor name, address, **telephone number, & sprinkler contractor contact person.**
- g. Symbol & abbreviation key.
- h. Minimum scale for floor plans is 1/8" per ft. (For residential, 1/4" per ft. is preferred.)
- i. Applicable NFPA standard(s) and edition(s) used.
- j. For submittals with calculations or new pipe schedule systems, plans must indicate the WSSC Low Hydraulic Gradient (LHG) and High Hydraulic Gradient (HHG), or Hydraulic Information Sheet data.

#### **2. Architectural**

- a. Overall use (i.e. office building, warehouse, townhouse, day care, etc.) – both IBC and NFPA 101 occupancy classifications.
- b. Occupancy (specific intended use) of all rooms and areas.
  - If the Classification of Occupancy (hazard) is not obvious by the room name, provide further clarification.
  - For laboratories, provide NFPA 45 Laboratory Unit Fire Hazard Class.
- c. Location of all partitions and doors.
- d. Ratings of any fire walls, partitions, and doors; in particular when using the room design method.

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### C. INFORMATION REQUIRED ON DRAWINGS (cont'd.)

#### 2. Architectural (cont'd.)

- e. Ceiling construction and height.
- f. Ceiling obstructions and their dimensions. (lights, bulkheads, etc.)
- g. Explain blind spaces and other areas where sprinklers are not to be installed.
- h. Full height cross sections with enough detail to show all conditions. Provide elevations in terms of sea level for all floors and/or dimensions from the lowest floor level.
- i. In garages with standpipes, show parking space layout to enable verification of travel distance (hose reach).
- j. Show water curtains & 18-inch deep draft stops when required around floor openings.

#### 3. Site Plan

- a. To scale (indicate the scale) or dimensioned.
- b. Size, type, and arrangement of underground water mains and sprinkler supply line.
- c. Test point, water supply, and WSSC Low & High Hydraulic Gradient information.
- d. Sea level elevations for supply point & building slab.
- e. If underground pipe is installed by sprinkler contractor, show depth of cover.
- f. Point of compass. (North arrow)
- g. Fire Department Connection. (Within 100' of a hydrant for NFPA 13 & 14 systems.)
- h. Flow tests: show gauge & flow hydrants.
- i. When the Site Plan contains multiple buildings, it must clearly indicate the building(s) for which application for permit is being made and the address numbers of such.

#### 4. Water supply information

- a. New or existing tap - NFPA 13D systems:
  - Obtain Low and High Hydraulic Gradient information from WSSC (301-206-8807).
  - Convert to pressure available by subtracting the highest building elevation and multiplying by 0.433 as follows:  
(Low Gradient – building slab elevation) x 0.433 psi/ft. = pressure available at slab
- b. New Tap - All systems *except* NFPA 13D:
  - Obtain information from WSSC Hydraulic Information Sheet (HIS) from general contractor, consulting engineer, civil engineer or building owner.
  - Submit copy and/or reproduce on drawings.
- c. New Tap if no HIS exists - all systems *except* NFPA 13D:  
(Note: This is usually only applicable for NFPA 13R systems.)
  - Obtain current flow test, elevation, and date from WSSC at their Systems Maintenance Division, 14501 Sweitzer Lane, Laurel, MD, 20707. (301-206-8807)
  - Adjust for Low Hydraulic Gradient obtained from WSSC at the address above or phone the WSSC Water Resources Division at 301-206-8807.
- d. Existing underground lines - all systems *except* NFPA 13D:
  - Flow test inside the building shall be used due to unknown condition and available supply of the underground pipe. (It is not required that the City of Gaithersburg witness this test.)
  - Flow test must be no older than 1 year. (Remember to adjust for Low Hydraulic Gradient as above, and that outside hose allowance must still be included.)

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### **C. INFORMATION REQUIRED ON DRAWINGS (cont'd.)**

#### **4. Water supply information (cont'd.)**

##### **e. Pipe schedule systems:**

- Provide a graph of water supply vs. system demand to verify compliance with NFPA 13 water demand requirements for pipe schedule systems.
- Correct the water supply data to the base of the system riser.
- Show the end sprinkler pressure, elevation loss, and backflow preventer loss.

##### **f. Fire pumps:**

- Provide pump make and model number, and pump performance curves.
- Indicate the pump piping arrangement.

##### **g. Water tanks:**

- Indicate the tank capacity.
- Provide details of the tank piping and arrangement.

#### **5. System Layout**

- a. Pipe sizes (typical branch line sizes are acceptable).
- b. Center-to-center dimensions or cut-lengths of pipe, dimensions between sprinklers, and dimensions from sprinklers to walls in all areas & rooms.
  - For sloped ceilings, provide dimensions both along the slope and horizontal dimensions.
  - For above and below ceiling systems, give dimensions for both.
- c. Sizes & lengths of riser nipples & drops.
- d. Locations of high temperature sprinklers, if any.
- e. Pipe sizing shall be by pipe schedules or as proven by hydraulic calculation.
- f. Hanger locations.
- g. Valves, drains, and test connections.
- h. Hydraulic reference points corresponding to calculations.
- i. Residential sprinklers:
  - Indicate danger areas near heat producing devices in accordance with manufacturer's recommendations (cross-hatch & show dimensions).
  - In addition to being *required* in residential dwelling units, residential sprinklers are allowed in corridors that only serve dwelling units and other locations as permitted in NFPA 13R.
- j. For additions or modifications to existing systems, show enough of the existing system to enable verification of pipe schedule, feed mains, cross mains, & supply points.
- k. Elevations of sprinklers & supply points.
- l. Alarms and/or alarm connections.
- m. Sprinkler control valves (except elevator control valves) must be in stairs, valve rooms, or pump rooms.
- n. Multiple fire department connections on the same building must be interconnected.

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### C. INFORMATION REQUIRED ON DRAWINGS (cont'd.)

#### 5. System Layout (cont'd.)

##### o. Fire department connection(s):

- Show check valve & ball drip.
- Provide multiple Fire Department Connections for all high rises, and preferably wherever more than two inlets are required.
- Number of inlets shall be as follows:

<u>System Demand (gpm)</u>	<u>Min. # of 2 ½" inlets</u>
Up to 749	2
750 to 999	3
1000 and above	4

##### p. Zoning:

- By floor when required by City of Gaithersburg amendments.
- Coordinate with fire alarm & smoke control zones. Atriums will usually require independent zones.
- For 2-story floor openings that are not classified as atriums and that are enclosed on the upper level, sprinklers at the top of the opening must be zoned with the lower level.

#### 6. Riser Diagram

- a. Sizes of pipe and all devices.
- b. Make & model of alarm, dry pipe, or preaction valves.
- c. Fire department connection.
- d. Make, model & size of backflow preventer, detector check, and water meter (if required).
- e. Means for full flow testing of the backflow preventer. (where required)
- f. Air supervision for dry sprinkler systems or manual dry standpipe systems.
- g. For residential systems, indicate the location of the drain valve and combined domestic/sprinkler control valve.

#### 7. Calculation Design Areas (except NFPA 13D & 13R)

- a. Show clearly the boundary of each design area. It shall comprise the actual floor area covered inside walls and halfway between adjacent sprinklers. **Indicate actual total area calculated.**
- b. For the room design method or irregular areas not meeting the  $1.2 \sqrt{A}$  requirement, show fire resistance ratings of walls and doors to conform to NFPA 13.

#### 8. Notes

- a. Number of sprinklers on each sheet must be shown in the legend.
- b. Sprinkler symbols with make, model, orifice size, temperature rating, and SIN. If any special sprinklers are used (residential, QR, extended coverage, etc.), submit catalog cuts.
- c. Capacity in gallons of each dry pipe system.
- d. Pipe type & fitting types, welds and bends. If it varies, give type for each size.
- e. If plastic pipe is used:
  - Indicate hanger intervals per manufacturer.
  - Show detail of method of restraint at sprinkler to counteract water force.

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### **C. INFORMATION REQUIRED ON DRAWINGS (cont'd.)**

#### **8. Notes (cont'd.)**

- f. System design criteria (for each zone).
  - If pipe schedule: Indicate Classification of Occupancy (hazard) in accordance with Chapter 5 of NFPA 13.
  - If calculated: Indicate Classification of Occupancy (hazard), density, design area, hose allowance, safety factor, sprinkler protection area of coverage, and pipe sizing.
  - If storage: Provide design analysis referencing figures, curves, and area/density modifications.

#### **9. Standpipe Systems**

- a. Class I only. (Class II and Class III systems are prohibited.)
- b. Riser & hose connection locations and riser detail, including gauges at the top of each riser.
- c. Hose connection locations must meet required travel distance (hose reach). Show all doors to verify compliance. Travel distance must be measured at right angles.
- d. Hose connections located outside of stair enclosures cannot substitute for those required inside stair enclosures.
- e. If, in order to meet travel distance/reach requirements, supplemental hose connections are needed outside of stair enclosures, the supplemental hose connections must be located in public or main corridors as consistently as possible on all floor levels.
- f. Show the height of the hose connection above the finished floor.
- g. Show reducers, caps, and chains at each hose connection.
- h. Pressure regulating valves (PRVs) are not permitted if it is possible to obtain the required pressures with the main pump relief valve. If this is not possible, show PRVs only on hose connections that could have pressures above 175 psi. Indicate the highest potential pressure at each hose connection, and indicate pressure setting of each PRV.
- i. Hose connections located outside of stairs in Parking Garages shall not be obstructed by parking and shall be labeled with prominent signs or red column stripes. Preferably, they shall be located adjacent to drive aisles with acceptable barriers, or they shall be accessible via minimum 44" wide walkways defined by curbs or other approved fixed barriers.

#### **10. Fire Pump Details (if Fire Pump is part of the scope of work)**

- a. Capacity (flow & pressure), make, model, listing.
- b. Cross section.
- c. Bypass.
- d. Jockey pump.
- e. Controller locations.
- f. Relief valve, if required for diesel pumps or excess pressure due to the high gradient and 140% of the rated churn pressure.
- g. Relief valve drain piped outside.
- h. Existing pumps not in conformance must be upgraded if adding or extending systems.
- i. The eccentric suction reducer must be installed with the flat side on the bottom if the fed directly with an elbow from above.
- j. Hydrostatic test pressure: If the system can experience pressures greater than 150 psi due to the High Gradient plus 140% of the rated pressure, disregarding the relief valve setting.

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### **C. INFORMATION REQUIRED ON DRAWINGS (cont'd.)**

#### **11. High Piled & High Rack Storage**

- a. Storage height and arrangement including aisle widths.
- b. Commodity classification.
- c. Owner's written certification of all storage limitations imposed by the sprinkler design.
- d. Small hose connections. (Occupant use hose is prohibited in new & existing buildings.)
- e. Multiple level storage with open grated walkways must be designed for two scenarios:
  - The entire storage height as if the walkways were unobstructed, **and**
  - Each level individually as if the walkways were obstructed.

#### **12. Speculative Spaces (subject to tenant changes regardless of lease term)**

- a. New speculative spaces shall be designed per City of Gaithersburg amendments for adequate system flexibility.
- b. Mains only may be installed in future tenant spaces with no storage. Shell approval must include protection for all core and non-leasable areas, including means of egress.
- c. Provide phantom calculations to verify pipe sizing and sprinkler protection area of coverage for future tenant work for "mains only" installations, or for phased retrofits.
- d. For high piled or rack storage designs, hose connections, rack sprinklers, and column sprinklers may be installed as needed for each tenant. However, hose connection supply points must be shown for calculation purposes.
- e. Tenant protection area of coverage per sprinkler and pipe sizing changes shall conform to shell calculations and shall be consistent on any given floor.
- f. A change to a lower degree of Classification of Occupancy (hazard) must use the same pipe sizing as the shell layout, and spacing may be increased by density conversion. For example, a system originally designed to Ordinary Hazard (Group 2) with a density of 0.20 gpm/SF and sprinkler spacing of 100 SF per sprinkler would have a minimum sprinkler flow of 20 gpm. The new spacing for Light Hazard would be 20 gpm/0.10 gpm/SF, which equals 200 SF per sprinkler.
- g. A change to a higher degree of Classification of Occupancy (hazard) must be recalculated, unless the area changed consists of small rooms using the same pipe sizing and a decrease in spacing by density conversion. For example, a system originally designed to Light Hazard with a density of 0.10 gpm/SF and sprinkler spacing of 168 SF per sprinkler would have a minimum sprinkler flow of 16.8 gpm. The new spacing for Ordinary Hazard (Group 2) would be 16.8 gpm/0.20 gpm/SF, which equals 112 SF. In order to use this conversion method, these small rooms shall not have more than 6 sprinklers if the original design area was at least 1,500 SF, or no more than 3 sprinklers if the design area was less than 1,500 SF.
- h. The room design method and small room calculation exceptions are not permitted in speculative spaces due to potential for future wall demolition.
- i. Minimum 1" outlets shall be provided.
- j. Plugged outlets must be considered sprinklers for the purpose of pipe sizing.

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### **C. INFORMATION REQUIRED ON DRAWINGS (cont'd.)**

#### **13. Tenant Plans**

- a. Tenant location or area of work highlighted & all areas outside the scope of work crossed off.
- b. All notes from the list on Page 11 of this document.
- c. If the original system design criteria are not available, recalculation will be required.
- d. Original system criteria must be adhered to throughout any given floor. Redesign must be on an entire floor basis.
- e. Show enough of adjacent areas to enable verification of pipe sizing, and sprinkler spacing opposite any new walls.
- f. Arm-over and tie-in details.
- g. Number of added and relocated sprinklers. Cutting or extending drops, or changing sprinklers from upright to pendent (or vice versa) is not considered a relocate if sprinkler locations are not changed and the sprinkler K-factor is unchanged.
- h. If standpipes are provided, show hose connections and all doors to enable verification of compliance with travel distance (hose reach) limitations in accordance with NFPA 14.
- i. Locate new hose connections per Section 9 above.

### **D. INFORMATION REQUIRED ON CALCULATIONS**

#### **1. General**

- a. One set of calculations is required.
- b. Each calculation shall be **stapled separately**.
- c. Submit as many calculations as necessary to prove all conditions, including largest protection area of coverage per sprinkler, smallest pipe sizing, most demanding piping arrangements, most demanding sprinkler types, and different pipe types.

#### **2. Cover sheet of each calculation**

- a. Date.
- b. Project name and address.
- c. Floor level.
- d. Description of area.
- e. Identification corresponding to design area on plan.

#### **3. Design Criteria for NFPA 13D Systems**

- a. One sprinkler flowing at the required flow and pressure.
- b. Two sprinklers flowing at the required flow and pressure.
- c. Three sprinklers flowing if required by listing or City of Gaithersburg amendments.



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### D. INFORMATION REQUIRED ON CALCULATIONS (cont'd.)

#### 4. Design Criteria for NFPA 13R systems

- a. One sprinkler flowing at the required flow and pressure.
- b. All sprinklers within a compartment, up to a maximum of four sprinklers under a smooth, flat ceiling, or five sprinklers where required by City of Gaithersburg amendments.
- c. Areas outside dwelling units must be calculated per NFPA 13 unless the area meets all the criteria in NFPA 13R for a four-sprinkler design.
- d. Garages must be calculated in accordance with NFPA 13R.

#### 5. Design Criteria for all other systems

- a. Classification of Occupancy. (Hazard)
- b. Design area. (**Actual area calculated**, not the minimum required by NFPA 13.)
- c. Design density.
- d. Inside and outside hose allowances.
- e. Protection area of coverage per sprinkler as calculated.
- f. Water supply and pump information.
- g. Any general storage, shipping, receiving, loading, or other storage areas, regardless of room name, are classified as Ordinary Hazard (Group 2), unless special usage conditions and written owner certification allow Ordinary Hazard (Group 1) per NFPA 13 table for miscellaneous storage.
- h. Multi-purpose rooms in schools and other occupancies are considered at least Ordinary Hazard (Group 1). If there is no multi-purpose room in a school, the gymnasium shall be designed as Ordinary Hazard (Group 1).
- i. Space-saving filing or storage units that close/collapse against one another are classified as Extra Hazard (Group 2) due to the shielding of combustibles.
- j. Laboratory sprinkler systems, including those in health care occupancies, must be designed in accordance with NFPA 45 classifications.

#### 6. Calculation Format for NFPA 13D systems

- a. Per NFPA 13D.
- b. Include any devices not on forms such as backflow prevention devices and meters.
- c. Water pressure at street per Section C.4.a above.
- d. If system covers more than one dwelling unit, include 5 gpm per unit domestic demand.
- e. Match the source elevation in the calculations to the Low Hydraulic Gradient adjustment point.

#### 7. Calculation Format for all other systems

- a. Per NFPA 13 or NFPA 13R, as applicable.
- b. Sprinkler K-factor(s) and Sprinkler Identification Number(s) (SINs).
- c. Hydraulic reference points.
- d. Pipe sizes & lengths.
- e. Equivalent lengths for all fittings & devices – include & label.
- f. Friction loss factors expressed in psi/foot.
- g. Total friction loss between reference points.
- h. Pressure at each reference point.

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### **D. INFORMATION REQUIRED ON CALCULATIONS (cont'd.)**

#### **7. Calculation Format for all other systems (cont'd.)**

- i. Velocity & normal pressures (if used).
- j. Add inside hose allowance at the nearest hose connection and outside hose allowance at the nearest fire hydrant. (NFPA 13 systems only)
- k. Include water curtain demand for floor openings with the nearest calculation on the same floor. (NFPA 13 systems only)
- l. Include drops & armovers in calculations.
- m. Continue calculations to:
  - The point of connection when using the HIS.
  - The gauge hydrant when using an outside flow test.
  - The gauge location when using an inside flow test.

#### **8. Other**

- a. Summary graph sheet showing the adjusted water supply, pump adjustment, hose allowance, and system demand point.
- b. Gridded systems must include peaking proof and grid sketches showing reference points, flows, and flow directions.
- c. For systems with fire pumps, supply and demands must be corrected to the location of the pump to verify adequate suction pressure at 150% of pump capacity at Low Hydraulic Gradient.
- d. For systems with fire pumps, a maximum of 101% of the pump's rated pressure shall be used for churn unless a certified curve shows a higher churn pressure.
- e. For standpipe systems, include both the fire pump and FDC calculations unless the pump is designed for the full demand.
- f. Standpipe calculations may only use multiple FDC's for supply points if each meets the position and location requirements, including the proximity to the nearest fire hydrant.
- g. If pumps and/or tanks are used in areas with a public water supply, submit calculations to prove that the system cannot be designed to work with the public supply. All design variations, including sprinkler protection area of coverage, sprinkler orifice, size, pipe sizing, looping, and gridding must be explored before the pumps and/or tanks will be allowed.

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## - TENANT SPRINKLER DRAWING NOTES -

### Original Design Information:

Hazard: \_\_\_\_\_ Calculated Area: \_\_\_\_\_ Density: \_\_\_\_\_ Safety Factor: \_\_\_\_\_

Sprinkler spacing (max): \_\_\_\_\_

Sprinkler make/model: \_\_\_\_\_ Orifice: \_\_\_\_\_ Temp: \_\_\_\_\_ SIN: \_\_\_\_\_

Pipe Types: \_\_\_\_\_ Fitting types \_\_\_\_\_

Calculated Pipe Sizing: Armover size: \_\_\_\_\_ Length: \_\_\_\_\_

\_\_\_\_\_ sprinklers on \_\_\_\_\_ pipe

\_\_\_\_\_ sprinklers on \_\_\_\_\_ pipe

\_\_\_\_\_ sprinklers on \_\_\_\_\_ pipe

**Hazard Change:**

Density conversion to higher hazard: (\_\_\_\_\_ gpm orig. flow)/(\_\_\_\_\_ new density) = \_\_\_\_\_ SF  
(Only allowed for areas with 6 or fewer sprinklers for an original design area of 1,500 sq.ft., or 3 or fewer sprinklers for an original design area less than 1,500 sq.ft.)

New spacing to be used in all rooms of \_\_\_\_\_ Hazard (Group \_\_\_\_\_)

Density conversion to lower hazard: (\_\_\_\_\_ gpm orig. flow)/(\_\_\_\_\_ new density) = \_\_\_\_\_ SF  
New spacing to be used in all rooms of \_\_\_\_\_ Hazard (Group \_\_\_\_\_)

## New Sprinklers:

Make/model: \_\_\_\_\_ Orifice: \_\_\_\_\_ Temp: \_\_\_\_\_ SIN: \_\_\_\_\_

# of New Sprinklers: \_\_\_\_\_ #of relocated Sprinklers (off original outlets): \_\_\_\_\_

### New Pipe:

Detail # \_\_\_\_\_ for armover/tie-in details

Hangers to be installed per NFPA 13, see detail # \_\_\_\_\_

Hydrotest pressure shall be \_\_\_\_\_ due to high gradient and pump churn (w/o relief valve)

### Tenant Details:

Unless noted otherwise, all rooms are \_\_\_\_\_ occupancy, and ceiling height is \_\_\_\_\_

Laboratories are NFPA 45 Class

Tenant owner's full address: \_\_\_\_\_

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Contact: \_\_\_\_\_ Phone: \_\_\_\_\_

Building construction permit number:

MD state sprinkler license: Number \_\_\_\_\_ Expiration date \_\_\_\_\_

### Standpipe:

Code(check one):    ☐ Before 4/11/95 (100' hose with 30' stream)  
                          ☐ After 4/11/95 sprinklered (200' hose)  
                          ☐ After 4/11/95 not fully sprinklered (150' hose)

Number of new fire hose connections: \_\_\_\_\_ (5' AFF, with reducers, caps, chains)